

## Memorandum

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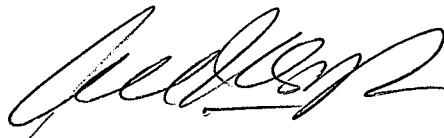
To: ALI ALQATAMI  
Design Engineer  
Project Development Division  
Design I Branch Z

Date: January 10<sup>th</sup>, 2011

File: 06-Mad-99  
PM 9.50/13.10  
06260-0E0401

Attn: Geo Leyva/Lee Tseng

From: ALBERT LEE, Chief  
District 6-Office of Traffic Operations



Subject: Safety Analysis Update

This is an update of the Safety Analysis Update dated January 20<sup>th</sup>, 2010 for the above referenced project in Madera County. This Safety Analysis Update supersedes the previous Safety Analysis. The Project proposes to rehabilitate the existing highway segment and ramps in both directions from 0.25 mile south of South Madera OC to 0.37 mile north of Avenue 16 OC in the City of Madera. The Project proposes to replace all failed PCC panels with full AC, cold plane AC/PCC on the outside lanes, and overlay all lanes and shoulder with AC, from PM 9.5/10.00 and PM 11.7/13.1 on both directions. From PM 10.0/11.7 in both directions, the Project proposes to replace PCC inside lanes and AC shoulders with PCC and replace the outside lanes with continuous reinforced concrete pavement (CRCP). A field review was conducted on December 10<sup>th</sup>, 2009.

### Existing Conditions:

This section of Route 99 is an urban four-lane divided freeway on level terrain with mostly tangent alignment and adequate sight distance. The mainline roadway has 12 foot PCC or AC lanes, 2 to 10 foot AC inside shoulders, and 10 foot AC outside shoulders. The ramps have 1 to 2 foot inside shoulders and 8 to 10 foot outside shoulders. There is a paved median and concrete median barrier from the beginning of the project to the Avenue 16 OC. The median barrier is Type 50 south of Jct 99/145 and Type 60 to the north. North of Avenue 16 to the end of the project limits, the median is unpaved with oleander and two single thrie beam barriers from Avenue 16. There are rumble strips in the inside and outside shoulders at the beginning of the project.

The posted speed limit is 65 mph. All existing signs, stripes, and pavement markers are in good condition. The pavement skid test resistance value (SN 40) based on the skid test conducted on May 2003 varies from 31 to 50 for both directions, indicating no pavement friction problems.

The 2007 daily percentage heavy vehicles within the project limits are 22 to 24%. The current (2008) ADT on Route 99 within the project limits are as follows:

| <u>PM</u>   | <u>Present ADT (2008)</u> |
|-------------|---------------------------|
| 9.49-10.27  | 61,000                    |
| 10.27-11.01 | 65,000                    |
| 11.01-12.13 | 68,000                    |
| 12.13-13.10 | 61,000                    |

There are nine bridges within the project limits:

| <u>PM</u> | <u>BRIDGES</u>              |
|-----------|-----------------------------|
| 9.743     | South Madera OC 41-46       |
| 10.268    | Jct 145/99 Separation 41-47 |
| 10.761    | West Sixth Street OC 41-48  |
| 10.844    | West Yosemite Avenue OC     |
| 11.009    | West Fourth Street OC 41-50 |
| 11.091    | Madera Underpass 41-51      |
| 11.646    | Fresno River Bridge 41-52   |
| 12.125    | Cleveland Avenue OC 41-53   |
| 12.752    | Avenue 16 OC 41-58          |

There are seventeen ramps within the project limits:

| <u>PM</u> | <u>RAMPS</u>                             |
|-----------|--|
| 9.560     | NB off to Gateway Drive                  |
| 10.092    | NB off to Route 145                      |
| 10.106    | SB on from Route 145                     |
| 10.410    | NB on from Route 145                     |
| 10.462    | SB off to Route 145                      |
| 10.883    | SB on from 4 <sup>th</sup> Street        |
| 10.918    | NB off to 4 <sup>th</sup> Street         |
| 11.258    | SB off to 2 <sup>nd</sup> Street         |
| 11.269    | NB on from 2 <sup>nd</sup> Street        |
| 11.942    | NB off to Avenue 15 ½ (Cleveland Avenue) |
| 12.001    | SB on from Avenue 15 ½                   |
| 12.242    | NB on from Avenue 15 ½                   |
| 12.304    | SB off to Avenue 15 ½                    |
| 12.722    | NB off to Avenue 16                      |
| 12.815    | SB on from Avenue 16                     |
| 12.924    | NB on from Avenue 16                     |
| 12.986    | SB off to Avenue 16                      |

### **Safety-Related Observations and Recommendations:**

#### **Accident History:**

The accidents for the northbound mainline, southbound mainline, and ramps of Route 99 will be analyzed separately.

The accident history for the northbound segment of Route 99 for the most recent three-year study period (between 01-01-06 and 12-31-08) as shown on Table B indicates that the Actual accident rates are **lower** than the Statewide Average accident rates for similar roadways with comparable traffic volumes. In the southbound direction, the Actual Fatal plus Injury and Total accident rates are **lower** than the Statewide Average accident rates. However, the Actual Fatal accident rate is **higher** than the Statewide Average Fatal accident rate. The accident rates in accidents per million-vehicle-miles are:

| Freeway Segment     | Actual (MVM) |      |       | Average (MVM) |      |       |
|---------------------|--------------|------|-------|---------------|------|-------|
|                     | Fatal        | F+I  | Total | Fatal         | F+I  | Total |
| PM 9.50/13.100      |              |      |       |               |      |       |
| Northbound Route 99 | 0.008        | 0.20 | 0.51  | 0.010         | 0.31 | 0.95  |
| Southbound Route 99 | 0.023        | 0.29 | 0.85  | 0.010         | 0.31 | 0.95  |

#### **Northbound:**

There were 66 accidents (1-Fatal, 25-Injury, 40 Property Damage Only (PDO)) for the freeway segment in the northbound direction. The types of accidents are:

| Primary Collision Factor | Type of Accident |           |          |           |            |           |       |
|--------------------------|------------------|-----------|----------|-----------|------------|-----------|-------|
|                          | Head-On          | Sideswipe | Rear-End | Broadside | Hit Object | Auto/Peds | Other |
| Influence of Alcohol     |                  | 1         | 1        | 1         | 3          |           |       |
| Following too Close      |                  |           | 1        |           |            |           |       |
| Improper Turn            |                  | 1         |          |           | 14         |           |       |
| Speeding                 |                  | 1         | 13       |           | 4          |           |       |
| Other Violation          |                  | 11        | 2        |           | 7          | 1         |       |
| Other Than Driver        |                  |           | 1        |           | 3          |           | 1     |
| Total                    |                  | 14        | 18       | 1         | 31         | 1         | 1     |

The primary collision factor for one Auto/Peds fatal accident at approximately 500 feet north of Gateway Drive, PM 09.59 is Other Violation. The accident occurred when a pedestrian was crossing southbound and northbound Route 99 struck by vehicles travelling on the northbound lanes #1 and #2. The accident occurred in clear, dark, and dry conditions.

The objects struck from the 31 hit object accidents are the following:

| Object Struck             | No. of Occurrences |
|---------------------------|--------------------|
| Side of Bridge Railing    | 1                  |
| Bridge Approach Guardrail | 1                  |
| Traffic Sign/Sign Post    | 2                  |
| Guardrail                 | 1                  |
| Barrier                   | 12                 |
| Wall (Exc. sound walls)   | 1                  |
| Dike or Curb              | 3                  |
| Fence                     | 1                  |
| Trees                     | 1                  |
| Plants                    | 1                  |
| Other Object on Road      | 1                  |
| Crash Cushions (Sand)     | 1                  |
| V1 through V9             | 5                  |
| Total                     | 31                 |

### **Southbound:**

There were 110 accidents (3-Fatal, 34-Injury, 73-PDO) for the freeway segment in the southbound direction. The types of accidents are:

| Primary Collision Factor | Type of Accident |           |          |           |            |          |       |
|--------------------------|------------------|-----------|----------|-----------|------------|----------|-------|
|                          | Head-On          | Sideswipe | Rear-End | Broadside | Hit Object | Overturn | Other |
| Influence of Alcohol     |                  |           | 4        |           | 3          |          |       |
| Improper Turn            |                  | 2         |          | 1         | 17         | 4        |       |
| Speeding                 | 1                |           | 36       | 2         | 7          | 2        |       |
| Other Violation          |                  | 10        | 6        | 1         | 5          |          |       |
| Other Than Driver        |                  |           |          |           | 6          |          | 2     |
| Unknown                  |                  |           |          |           |            |          | 1     |
| Total                    | 1                | 12        | 46       | 4         | 38         | 6        | 3     |

The primary collision factor for the first Hit Object fatal accident under the Yosemite OC Bridge, PM 10.85 is Influence of Alcohol. The accident occurred when a vehicle entered the southbound Route 99 from the 4<sup>th</sup> Street on-ramp and traveled on the right shoulder, struck the Yosemite Bridge abutment and approach guardrails. The accident occurred in the cloudy, dark, and wet condition.

The primary collision factor for the second Hit Object fatal accident at approximately 0.2 mile south of Fresno River, PM 11.45 is Other Violation. The accident occurred when a ladder from a vehicle V1 travelling in the southbound direction fell on the roadway in front of a vehicle V2 travelling behind V1. V2 tried to avoid the ladder, lost control, and struck a tree. The accident occurred in the cloudy, daylight, and wet condition.

The primary collision factor for the third Hit Object fatal accident at approximately 0.3 mile south of Fresno River Bridge, PM 11.41 is Improper Turn. The accident occurred when a vehicle travelling in the southbound direction drifted to the left in the center median and struck the concrete barrier and rolled over. The accident occurred in the clear, dark, and dry condition.

The objects struck from the 38 hit object accidents are the following:

| Object Struck           | No. of Occurrences |
|-------------------------|--------------------|
| Bottom of Structure     | 1                  |
| Light or Signal Pole    | 1                  |
| Guardrail               | 2                  |
| Barrier                 | 18                 |
| Wall (Exc. sound walls) | 1                  |
| Cut Slope or Embankment | 1                  |
| Fence                   | 2                  |
| Trees                   | 2                  |
| Plants                  | 1                  |
| Other Object on Road    | 3                  |
| No Object Involved      | 1                  |
| V1 through V9           | 5                  |
| Total                   | 38                 |

### On/Off Ramps:

The accident history for the same three-year study period for the following ramp indicates that the Actual Accident rates are **lower** than the Statewide Average accident rates. Therefore, no further analysis is needed. The accident rates in accidents per million-vehicles (MV) are:

| Ramp                               | PM     | Actual |       |       | Average |       |       |
|------------------------------------|--------|--------|-------|-------|---------|-------|-------|
|                                    |        | Fatal  | F + I | Total | Fatal   | F + I | Total |
| NB off-ramp to Gateway Drive       | 9.560  | 0.000  | 0.00  | 0.46  | 0.004   | 0.26  | 0.85  |
| NB on-ramp from Route 145          | 10.410 | 0.000  | 0.00  | 0.18  | 0.004   | 0.42  | 1.20  |
| SB on-ramp from 4 <sup>th</sup> St | 10.883 | 0.000  | 0.00  | 0.29  | 0.002   | 0.26  | 0.75  |
| NB off-ramp to 4 <sup>th</sup> St  | 10.918 | 0.000  | 0.29  | 0.59  | 0.004   | 0.42  | 1.20  |
| SB off-ramp to 2 <sup>nd</sup> St  | 11.258 | 0.000  | 0.00  | 0.25  | 0.004   | 0.28  | 0.95  |
| NB on-ramp from 2 <sup>nd</sup> St | 11.269 | 0.000  | 0.00  | 0.00  | 0.002   | 0.14  | 0.45  |
| NB off-ramp to Ave 15½             | 11.942 | 0.000  | 0.35  | 1.05  | 0.004   | 0.42  | 1.20  |
| SB on-ramp from Ave 15½            | 12.001 | 0.000  | 0.00  | 0.63  | 0.002   | 0.26  | 0.75  |
| SB off-ramp to Ave 15½             | 12.304 | 0.000  | 0.00  | 0.88  | 0.004   | 0.42  | 1.20  |
| SB on-ramp from Ave 16             | 12.815 | 0.000  | 0.00  | 0.00  | 0.002   | 0.16  | 0.55  |
| SB off-ramp to Ave 16              | 12.986 | 0.000  | 0.00  | 0.28  | 0.002   | 0.18  | 0.60  |

The numbers of accidents at the ramps are as follow:

- NB off-ramp to Gateway Drive : 2 accidents (0-Fatal, 0-Injury, 2-PDO)
- NB on-ramp from Route 145: 1 accident (0-Fatal, 0-Injury, 1-PDO)
- SB on-ramp from 4<sup>th</sup> Street: 1 accident (0-Fatal, 0-Injury, 1-PDO)
- NB off-ramp to 4<sup>th</sup> Street: 2 accidents (0-Fatal, 1-Injury, 1-PDO)
- SB off-ramp to 2<sup>nd</sup> Street: 1 accident (0-Fatal, 0-Injury, 1-PDO)
- NB on-ramp from 2<sup>nd</sup> Street: No accident
- NB off-ramp to Ave 15½: 9 accidents (0-Fatal, 3-Injury, 6-PDO)
- SB on-ramp from Ave 15½: 5 accidents (0-Fatal, 0-Injury, 5-PDO)
- SB off-ramp to Ave 15½: 2 accidents (0-Fatal, 0-Injury, 2-PDO)
- SB on-ramp from Ave 16: No accident
- SB off-ramp to Ave 16: 1 accident (0-Fatal, 0-Injury, 1-PDO)

The accident history for the same three-year study period for the following ramps indicates that the Actual Fatal and Fatal plus Injury accident rates are **lower** than the Statewide Average Fatal and Fatal plus Injury accident rates. However, the Actual Total accident rate is **higher** than the Statewide Average Total accident rate. The accident rates in accidents per million-vehicles are:

| Ramps                     |        | Actual (MV) |       |       | Average (MV) |       |       |
|---------------------------|--------|-------------|-------|-------|--------------|-------|-------|
|                           | PM     | Fatal       | F + I | Total | Fatal        | F + I | Total |
| SB on-ramp from Route 145 | 10.106 | 0.000       | 0.00  | 0.79  | 0.001        | 0.19  | 0.60  |
| NB on-ramp from Ave 15½   | 12.242 | 0.000       | 0.00  | 0.84  | 0.002        | 0.26  | 0.75  |
| NB on from Ave 16         | 12.924 | 0.000       | 0.00  | 0.81  | 0.002        | 0.26  | 0.75  |

SB on-ramp from Route 145:

There were 2 accidents (0-Fatal, 0-Injury, 2-PDO) for the southbound on-ramp from Route 145. The types of accidents are:

| Primary Collision Factor | Type of Accident |           |          |           |            |          |       |
|--------------------------|------------------|-----------|----------|-----------|------------|----------|-------|
|                          | Head-On          | Sideswipe | Rear-End | Broadside | Hit Object | Overtake | Other |
| Improper Turn            |                  |           |          |           | 2          |          |       |
| Total                    |                  |           |          |           | 2          |          |       |

Northbound on-ramp from Ave 15½:

There were 2 accidents (0-Fatal, 0-Injury, 2-PDO) for the northbound on-ramp from Ave 15½. The types of accidents are:

| Primary Collision Factor | Type of Accident |           |          |           |            |          |          |
|--------------------------|------------------|-----------|----------|-----------|------------|----------|----------|
|                          | Head-On          | Sideswipe | Rear-End | Broadside | Hit Object | Overturn | Auto/Ped |
| Speeding                 |                  |           | 2        |           |            |          |          |
| Total                    |                  |           | 2        |           |            |          |          |

Northbound on-ramp from Ave 16:

There were 3 accidents (0-Fatal, 0-Injury, 3-PDO) for the northbound on-ramp from Ave 16. The types of accidents are:

| Primary Collision Factor | Type of Accident |           |          |           |            |          |       |
|--------------------------|------------------|-----------|----------|-----------|------------|----------|-------|
|                          | Head-On          | Sideswipe | Rear-End | Broadside | Hit Object | Overturn | Other |
| Influence of alcohol     |                  |           |          |           | 1          |          |       |
| Failure To Yield         |                  |           |          | 1         |            |          |       |
| Speeding                 |                  |           | 1        |           |            |          |       |
| Total                    |                  |           | 1        | 1         | 1          |          |       |

The accident history for the same three-year study period for the following ramps indicates that the Actual Fatal accident rate is **lower** than the Statewide Average Fatal accident rate. However, the Actual Fatal plus Injury and Total accident rates are **higher** than the Statewide Average Fatal plus Injury and Total accident rates. The accident rates in accidents per million-vehicles are:

| Ramps                     |        | Actual (MV) |       |       | Average (MV) |       |       |
|---------------------------|--------|-------------|-------|-------|--------------|-------|-------|
|                           | PM     | Fatal       | F + I | Total | Fatal        | F + I | Total |
| NB off-ramp to Route 145. | 10.092 | 0.000       | 0.45  | 1.81  | 0.002        | 0.31  | 1.00  |
| SB off-ramp to Route 145. | 10.462 | 0.000       | 0.46  | 1.08  | 0.004        | 0.42  | 1.20  |
| NB off-ramp to Ave 16     | 12.722 | 0.000       | 0.74  | 1.49  | 0.002        | 0.36  | 1.10  |

NB off-ramp to Route 145:

There were four accidents (0-Fatal, 1-injury, 3-PDO) for the northbound off-ramp to Route 145. The types of accidents are:

| Primary Collision Factor | Type of Accident |           |          |           |            |          |       |
|--------------------------|------------------|-----------|----------|-----------|------------|----------|-------|
|                          | Head-On          | Sideswipe | Rear-End | Broadside | Hit Object | Overturn | Other |
| Improper Turn            |                  |           |          |           | 1          |          |       |
| Speeding                 |                  |           | 3        |           |            |          |       |
| Total                    |                  |           | 3        |           | 1          |          |       |

SB off-ramp to Route 145:

There were seven accidents (0-Fatal, 3-injury, 4-PDO) for the southbound off-ramp to Route 145 Street. The types of accidents are:

| Primary Collision Factor | Type of Accident |           |          |           |            |          |       |
|--------------------------|------------------|-----------|----------|-----------|------------|----------|-------|
|                          | Head-On          | Sideswipe | Rear-End | Broadside | Hit Object | Overtake | Other |
| Influence of Alcohol     |                  |           |          |           | 1          |          |       |
| Failure to Yield         |                  |           |          | 1         |            |          |       |
| Improper Turn            |                  | 1         |          |           |            | 1        |       |
| Speeding                 |                  |           | 1        |           |            |          |       |
| Other Violation          |                  |           | 1        | 1         |            |          |       |
| Total                    |                  | 1         | 2        | 2         | 1          | 1        |       |

NB off-ramp to Avenue 16:

There were two accidents (0-Fatal, 1-Injury, 1-PDO) for the northbound off-ramp to Avenue 16. The types of accidents are:

| Primary Collision Factor | Type of Accident |           |          |           |            |          |       |
|--------------------------|------------------|-----------|----------|-----------|------------|----------|-------|
|                          | Head-On          | Sideswipe | Rear-End | Broadside | Hit Object | Overtake | Other |
| Influence of Alcohol     |                  |           | 1        |           |            |          |       |
| Other Violation          |                  |           |          | 1         |            |          |       |
| Total                    |                  |           | 1        | 1         |            |          |       |

**Metal Beam Guardrail:**

NB Madera Gateway Drive Exit OH Sign, PM 9.50:

The guardrail shielding the OH sign with an 8 post SRT meets the current standard. The bolts at Post 7 and 8 should be removed. Maintenance would remove these bolts. The guardrail upgrade at this location is not needed.

South Madera/Gateway Drive OC 41-46, PM 9.743:

There are approach guardrails to the concrete bridge abutments with 8-post Type SRT terminal systems on the right shoulders in the northbound direction. The guardrail and concrete abutment connection is not to current standard. The connection should be replaced with Type WB transition railing with the construction of a concrete anchor block per Standard Plans A77J3 and A77J4, and Type 12B Layout per Standard Plan A77F1. The bushes blocking the guardrail in the northbound direction should be removed. The approach guardrail in the southbound direction has been upgraded to current standard.

The Gateway Drive OC was a one way road in the westbound direction. The OC was widened to a 2-lane 2-way road by the City project (EA 407211). The guardrails on the OC were upgraded to current standards.

Junction 145/99 Separation Bridge 41-47, PM 10.268:

There are approach guardrails to the concrete bridge abutments with buried end anchor treatment on the right shoulders in the northbound and southbound directions. The entire length of the



concrete bridge abutments are shielded with guardrails that are not to current standard. These guardrails will be upgraded by the Route 99/145 widening project (EA 407211), which is currently under construction.

There are no approach and departure guardrail to the bridge rail on Route 145 OC Bridge.

Southbound Route 99, PM 10.368:

There is a Census control cabinet on the right side of the southbound Route 99 approximately 500 feet north of southbound off-ramp to Route 145 that is inside the clear recovery zone. The cabinet should be shielded with a Type 16B Layout per Standard Plan A77G3. The high dike along southbound Route 99 at this location should be removed or replaced with Type "E" dike. Dikes Type "F" and Type "C" should be used under the guardrail and in front of the terminal system.

West Sixth Street OC 41-48, PM 10.761:

There is an approach guardrail to the concrete bridge abutment with buried end anchor treatment on the right shoulders in the northbound direction. The entire length of the concrete bridge abutment is shielded with guardrail that is not to current standard. The guardrail should be reconstructed with Type 12C Layout per Standard Plan A77F2, and Type WB transition railing connection per Standard Plan A77J4 with the construction of a concrete anchor block per Standard Plan A77J3.

There are no approach and departure guardrails at all corners and no curb ramps on the south sidewalk on the West Sixth Street OC Bridge. Curb ramps should be constructed to meet the current ADA standard.

West Yosemite Avenue OC, PM 10.884:

There are approach guardrails to the concrete bridge abutments with buried end anchor treatment on the right shoulders in the northbound and southbound directions. The guardrail and concrete abutment connections are not within the current standard. These connections should be replaced with Type WB transition railing per Standard Plan A77J4 with the construction of concrete anchor blocks per Standard Plan A77J3, and Type 12C Layout per Standard Plan A77F2. All flat plate washers should be removed.

There are no approach and departure guardrails at all corners on the West Yosemite Avenue OC Bridge.

West Fourth Street OC 41-50, PM 11.009:

There are approach guardrails to the concrete bridge abutments with buried end anchor treatment on the right shoulders in the northbound and southbound directions. The entire length of the concrete bridge abutments is shielded with guardrails that are not to current standard. These guardrails should be reconstructed with Type 12C Layout per Standard Plan A77F2 and Type

WB transition railing per Standard Plan A77J4 with the construction of concrete anchor blocks per Standard Plans A77J3.

There are no approach and departure guardrails at all corners on the West Fourth Street OC Bridge.

Madera Underpass 41-51, PM 11.091:

There are approach guardrails to the concrete abutments with buried end anchor treatment on the right shoulders in the northbound and southbound directions. The faces of the concrete abutments are not flush. There are 24 to 28 inches offset between the wall attached with guardrail and the wall behind the guardrail. These guardrails should be upgraded with Type 12C Layout per Standard Pan A77F2 and Type WB transition railing per Standard Plan A77J4 with the construction of concrete anchor blocks per Standard Plans A77J3. The concrete anchor blocks should be constructed to connect to the outside wall of the concrete abutments.

Southbound off-ramp to 2<sup>nd</sup> Street, PM 11.18:

The guardrail along the left side of the southbound off-ramp to 2<sup>nd</sup> Street has been upgraded to current standard.

Fresno River Bridge 41-52, PM 11.646:

The approach guardrails to the bridge rails have been upgraded to current standards (EA 0E4701).

Cleveland Avenue OC 41-53, PM 12.125:

There are approach guardrails to the concrete bridge abutments with buried end anchor treatment on the right shoulders in the northbound and southbound directions. The guardrail and concrete abutment connections are not to the current standard. These connections should be replaced with Type WB transition railing per Standard Plan A77J4 with the construction of concrete anchor blocks per Standard Plans A77J3. Type 12C Layout per Standard Plan A77F2 should be used for the approach guardrail to the bridge rail.

There are no approach and departure guardrails at all corners on the Cleveland Avenue OC Bridge.

Northbound loop off-ramp to Avenue 16 (Right Side), PM 12.722:

There is an approach guardrail to the concrete abutment with 9-post Type SRT terminal system on the right shoulder in the northbound off-ramp to Avenue 16. There is an offset of approximately 35 inches with no connection between the face of guardrail and the concrete abutment. The approach guardrail should be reconstructed with Type 12B Layout with Type WB transition connection and the construction of a concrete anchor block. The minimum clearance between the face of railing to the face of fixed object shall be 2 feet 3 inches with the construction of strengthen stiffen sections behind the fixed object per Standard Plan A77G3.

There is a tree larger than 4 inches in diameter located behind the SRT terminal system within the clear recovery zone. It is recommended that the guardrail be extended by two sections to shield the tree. The existing 9-post Type SRT terminal system may be reconstructed or be replaced with 8-Post flared-end section. A construction detail and the layout should be provided for review.

Northbound Route 99 and northbound loop off-ramp to Avenue 16 (Left Side), PM 12.722:

The guardrail shielding the columns in the gore area on the right shoulder in the northbound direction is not to current standard. The columns facing northbound Route 99 should be shielded with Type 60E concrete barrier per Standard Plan A76C, the guardrails along the left side of the northbound loop off-ramp should be replaced with Type 60 concrete barrier. The south end of the concrete barriers at gore area should be shielded with an alternate Caltrans approved crash cushions. The departure end of the Type 60 concrete barrier along the left side of the northbound off-ramp should end at 30 feet from the edge of travel way of northbound on-ramp/Gateway Drive. A construction detail and layout should be provided for review.

Southbound Route 99 at Avenue 16, PM 12.752:

The approach guardrail connection to the concrete abutment on the right side of southbound direction is not to current standard. The connection should be replaced with Type WB transition railing with the construction of a concrete anchor block per Standard Plan A77J3 and A77J4. Type 12B layout should be used per Standard Plan A77F1.

Southbound Route 99 median, PM 12.752:

The concrete barrier and single thrie beam barrier connection in the southbound direction is not to current standard. This connection should be upgraded with Type STB transition railing connection per Standard Plan A78J with the construction of a concrete anchor block per Standard Plan A78G.

Avenue 16 OC 41-58, PM 12.752:

The bridge rails on Avenue 16 OC Bridge have been upgraded to current standard (EA 0F4001 and 0C5101).

"Avenue 16 Exit" OH Sign, PM 13.03:

There is guardrail shielding the "Avenue 16 Exit" OH sign structure north of the Avenue 16 OC in the southbound direction. The guardrail and OH sign will be removed and replaced with the OH sign on the future Ellis Street OC Bridge by the City project (EA 425301).

**General Comments:**

Existing shoulders on the mainline freeway and the on/off ramps that do not meet current standard should be widened to standard.

The existing vertical clearance on all overcrossing bridges on Route 99 within the project limits should be maintained. A mandatory design exception will be required for all overcrossing bridges less than 16 foot minimum vertical clearance.

Type 50 barrier that will be lower than 29 inches, not including any cap, should be replaced with Type 60 barrier. Thrie beam barrier in the median less than 32 inches height should be reconstructed to current standard height.

The existing rumble strips at the beginning of the project should be reconstructed. Rumble strips should be added to AC shoulders at other locations.

All signs and stripes should be designed according to September 2006 CAMUTCD.

Existing guardrails at the approaches of structures should be reconstructed per Standard Plans A77J4 (MBGR Transition Railing, Type WB), A77J3 (connections to concrete bridge abutments), A77F1, A77F2, and A77F4.

A 4 foot minimum clearance is required between the face of the railing and the face of a fixed object located directly behind a guard railing with standard post spacing of 6.25 feet. Guardrails are to be constructed per the detail "Strengthened Railing Sections for Fixed Objects" in Standard Plan A77G3 where the clearance between the face of the railing and the face of a fixed object is less than 4 feet, but not less than 27 inches. Where the clearance is less than 27 inches, a concrete wall or barrier should be constructed to shield the fixed object.

Guardrails on narrow embankments and roadway should be constructed per Traffic Manual Figure 7-4 and Standard Plan A77C3. At locations where posts need to be eliminated, overlapping of guardrails should be constructed per Traffic Manual Figure 7-5.

Standard height for new installations or reconstruction of metal beam guardrail is 27.75 inches with a tolerance of 0.5 inch. The height of existing metal beam guardrail should be adjusted if lower than 26 inches. The cross slope in front of guardrail should be 1:10 or flatter. Rectangular flat plate washers on existing MBGR line posts should be removed.

Dike positioning in relation to the guardrail should be per Standard Plan A77C4. Type A dikes and nonstandard AC dikes in fill or cut slopes that are inappropriate for such roadway conditions should be replaced with Type E dikes with shoulder backing where feasible.

Ali Alqatami  
January 10<sup>th</sup>, 2011  
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All fixed objects within the clear recovery zone should be removed, relocated, or shielded with MBGR. There are lighting standards that are not slip base and located within the clear recovery area within the Project limits. These lighting standards should be made breakaway. New guardrails that will be constructed to shield fixed objects should have a minimum of three sections (37.5 feet) of rail in addition to the terminal system per Standard Plan A77G3, Layouts 16A and 16B.

Edge of pavement drop-offs should be avoided. It is recommended that the ground be graded flush with the shoulders to eliminate the edge of pavement drop-offs.

High dike in gore areas should be replaced with mountable dike or B4 curb if needed for drainage or if there is a gore cross slope greater than standard at a freeway inlet.

Side slopes should be made recoverable with 1:4 slope or flatter where feasible.

Object markers should be placed in front of guardrail flares or at fixed objects as appropriate. Use OM-3L/R (Type P) if the distance from the face of rail to the edge of traveled way is less than 8 feet or OM2-2V (Type L) if the distance is between 8 feet and 12 feet.

For drain inlets, consideration should be given to constructing flush top-opening drainage inlets.

It is recommended that the Area Maintenance Supervisor be contacted for information on maintenance and drainage problems within the project limits.

If you have any questions, please call Sofia Liang at 445-5578.

Attachments: Table B summary  
cc: Tom Fisher, Hydraulics Branch  
Dan Waterhouse, Environmental Branch

OTM22130  
12/23/2009  
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California Department of Transportation  
Table B - Selective Accident Rate Calculation

Page# 1  
Event ID : 2862515

| Location Description   | Rate Group (RUS) | 3601 MI H<br>36 mo. NORTH NA | 06 MAD 099 013.100<br>2008-01-01 2008-12-31 | No. of Accidents / Significance |     |     |     | ADT          |     | Pers<br>Kld<br>Inj | Significance |     |      | Total<br>MV+ or<br>MVM | Actual |       | Accident Rates |     |         |
|--|------------------|------------------------------|---|---------------------------------|-----|-----|-----|--------------|-----|--------------------|--------------|-----|------|------------------------|--------|-------|----------------|-----|---------|
|  |                  |                              |   | Tot                             | Fat | Inj | F+I | Multi<br>Veh | Wet | Dark               | Fat          | Wet | Dark |                        | Fat    | F+I   | Tot            | Fat | Average |
| 06 MAD 099 009.500 - 06 MAD 099 013.100<br>0123-0001 2008-01-01 2008-12-31 |                  |                              |   | 66                              | 1   | 25  | 26  | 40           | 8   | 26                 | 1            | 26  | 1    | 32.7                   | 129.25 | 0.008 | .20            | .51 | 0.010   |
|  |                  |                              |   |                                 |     |     |     |              |     |                    | 40           |     |      |                        |        |       |                | .31 | .95     |

Accident Rates expressed as: # of accidents / Million vehicle miles

+ denotes that Million Vehicles (MV) used in accident rates instead (for intersections and ramps).

For Ramps RUS only considers R(Rural) U(Urban)



California Department of Transportation  
Table B - Selective Accident Rate Calculation

| Location Description   | Rate Group (RUS) | No. of Accidents / Significance |     |     |     |           |     | Pars |         | ADT Main | Total MV+ or MVM | Actual |     | Accident Rates |       |          |
|--|------------------|---------------------------------|-----|-----|-----|-----------|-----|------|---------|----------|------------------|--------|-----|----------------|-------|----------|
|  |                  | Tot                             | Fat | Inj | F+I | Multi Veh | Wet | Dark | Kld Inj |          |                  | Fat    | F+I | Tot            | Fat   | Average  |
| 06 MAD 099 009.560 099/NB OFF TO GATEWAY DR 0123-0001 2006-01-01 2008-12-31  | R 18 U           | 2                               | 0   | 0   | 0   | 2         | 0   | 0    | 0       | 4.0      | 4.33 +           | 0.000  | .00 | .46            | 0.004 | .26 .85  |
| 06 MAD 099 010.092 099/NB OFF TO RTE 145 0123-0001 2006-01-01 2008-12-31     | R 54 U           | 4                               | 0   | 1   | 1   | 3         | 0   | 2    | 0       | 2.0      | 2.21 +           | 0.000  | .45 | 1.81           | 0.002 | .31 1.00 |
| 06 MAD 099 010.106 099/SB ON FR RTE 145 0123-0001 2006-01-01 2008-12-31      | R 56 U           | 2                               | 0   | 0   | 0   | 0         | 0   | 1    | 0       | 2.3      | 2.54 +           | 0.000  | .00 | .79            | 0.001 | .19 .60  |
| 06 MAD 099 010.410 099/NB ON FR RTE 145 0123-0001 2006-01-01 2008-12-31      | R 56 U           | 1                               | 0   | 0   | 0   | 1         | 0   | 0    | 0       | 5.0      | 5.50 +           | 0.000  | .00 | .18            | 0.001 | .19 .60  |
| 06 MAD 099 010.482 099/SB OFF TO RTE 145 0123-0001 2006-01-01 2008-12-31     | R 10 U           | 7                               | 0   | 3   | 3   | 5         | 1   | 2    | 0       | 5.9      | 6.50 +           | 0.000  | .46 | 1.08           | 0.004 | .42 1.20 |
| 06 MAD 099 010.883 099/SB ON FROM 4TH ST 0123-0001 2006-01-01 2008-12-31     | R 12 U           | 1                               | 0   | 0   | 0   | 1         | 0   | 1    | 0       | 3.2      | 3.47 +           | 0.000  | .00 | .29            | 0.002 | .26 .75  |
| 06 MAD 099 010.918 099/NB OFF TO 4TH ST 0123-0001 2006-01-01 2008-12-31      | R 10 U           | 2                               | 0   | 1   | 1   | 1         | 0   | 0    | 0       | 3.1      | 3.42 +           | 0.000  | .29 | .59            | 0.004 | .42 1.20 |
| 06 MAD 099 011.258 099/SB OFF TO 2ND ST 0123-0001 2006-01-01 2008-12-31      | R 26 U           | 1                               | 0   | 0   | 0   | 0         | 0   | 0    | 0       | 3.7      | 4.02 +           | 0.000  | .00 | .25            | 0.004 | .28 .95  |
| 06 MAD 099 011.269 099/NB ON FROM 2ND ST 0123-0001 2006-01-01 2008-12-31     | R 32 U           | 0                               | 0   | 0   | 0   | 0         | 0   | 0    | 0       | 4.8      | 5.28 +           | 0.000  | .00 | .00            | 0.002 | .14 .45  |
| 06 MAD 099 011.942 099/NB OFF TO AVE 15 1/2 0123-0001 2006-01-01 2008-12-31  | R 10 U           | 9                               | 0   | 3   | 3   | 9         | 2   | 3    | 0       | 7.8      | 8.59 +           | 0.000  | .35 | 1.05           | 0.004 | .42 1.20 |
| 06 MAD 099 012.001 099/SB ON FROM AVE 15 1/2 0123-0001 2006-01-01 2008-12-31 | R 12 U           | 5                               | 0   | 0   | 0   | 3         | 2   | 2    | 0       | 7.3      | 7.97 +           | 0.000  | .00 | .63            | 0.002 | .26 .75  |
| 06 MAD 099 012.242 099/NB ON FROM AVE 15 1/2 0123-0001 2006-01-01 2008-12-31 | R 12 U           | 2                               | 0   | 0   | 0   | 2         | 1   | 1    | 0       | 2.2      | 2.39 +           | 0.000  | .00 | .84            | 0.002 | .26 .75  |

Accident Rates expressed as: # of accidents / Million vehicle miles

+ denotes that Million Vehicles (MV) used in accident rates instead (for intersections and ramps).

For Ramps RUS only considers R(Rural) U(Urban)



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California Department of Transportation  
Table B - Selective Accident Rate Calculation

Page# 2  
Event ID : 2862548

| Location Description  | Rate Group (RUS) | No. of Accidents / Significance |     |     |    |           | ADT  |     | Total MV+ or MVM | Actual |     | Accident Rates |      |         |
|---|------------------|---------------------------------|-----|-----|----|-----------|------|-----|------------------|--------|-----|----------------|------|---------|
|   |                  | Tot                             | Fat | Inj | F+ | Multi Veh | Dark | Wet |                  | Kld    | Inj | Fat            | Tot  | Average |
| 06 MAD 099 012.304 099/SB OFF TO AVE 15 1/2 0123-0001 2006-01-01 2008-12-31 | R 10<br>U        | 2                               | 0   | 0   | 0  | 2         | 0    | 1   | 2.1              | 0      | 0   | 0.000          | .88  | 0.004   |
|   |                  |                                 |     |     |    |           |      |     | 2.28 +           |        |     |                | .42  | 1.20    |
| 06 MAD 099 012.722 099/NB OFF TO AVE 16 0123-0001 2006-01-01 2008-12-31     | R 22<br>U        | 2                               | 0   | 1   | 1  | 2         | 0    | 0   | 1.2              | 0      | 0   | 0.000          | 1.49 | 0.002   |
|   |                  |                                 |     |     |    |           |      |     | 1.35 +           |        |     |                | .36  | 1.10    |
| 06 MAD 099 012.815 099/SB ON FROM AVE 16 0123-0001 2006-01-01 2008-12-31    | R 28<br>U        | 0                               | 0   | 0   | 0  | 0         | 0    | 0   | 1.1              | 0      | 0   | 0.000          | .00  | 0.002   |
|   |                  |                                 |     |     |    |           |      |     | 1.21 +           |        |     |                | .16  | .55     |
| 06 MAD 099 012.924 099/NB ON FR AVE 16 0123-0001 2006-01-01 2008-12-31      | R 12<br>U        | 3                               | 0   | 0   | 0  | 2         | 1    | 1   | 3.4              | 0      | 0   | 0.000          | .81  | 0.002   |
|   |                  |                                 |     |     |    |           |      |     | 3.71 +           |        |     |                | .26  | .75     |
| 06 MAD 099 012.986 099/SB OFF TO AVE 16 0123-0001 2006-01-01 2008-12-31     | R 30<br>U        | 1                               | 0   | 0   | 0  | 1         | 0    | 0   | 3.3              | 0      | 0   | 0.000          | .28  | 0.002   |
|   |                  |                                 |     |     |    |           |      |     | 3.56 +           |        |     |                | .18  | .60     |

Accident Rates expressed as: # of accidents / Million vehicle miles

+ denotes that Million Vehicles (MV) used in accident rates instead (for intersections and ramps).

For Ramps RUS only considers R(Rural) U(Urban)